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The effect of increased minimum wage on child externalizing behaviors

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ABSTRACT

The Family Stress Model (FSM) has been used to show the relationship between socioeconomic disadvantage and child externalizing behaviors and suggests that interventions promoting economic security may be a promising approach to reduce child externalizing behavior. Using longitudinal data from the Fragile Families and Child Wellbeing study from 2002 to 2010 we examined the effect of minimum wage laws on child externalizing behaviors through a difference in difference in differences (DDD) study design. Externalizing behavior was assessed with the Child Behavior Checklist (CBCL) using the rule breaking, attention problems, and violence subscales. DDD analyses suggest a $1 increase in the minimum wage was associated with a 2% reduction in violent behaviors ($\beta = -1.90$, 95%CI[−3.12, −0.68], $p = 0.003$) for the most vulnerable families headed by a primary caregiver with less than a high school education. The study results suggest that increases in the minimum wage are associated with reductions in the most severe and costly externalizing behaviors among children. Study results contribute to a growing body of literature showing that increased family incomes have positive impacts on child development, and that minimum wage policy is potentially an effective mechanism for the primary prevention of violence.

1. Introduction

There is substantial evidence that economic disadvantage influences child development trajectories (Devenish et al., 2017; Reiss, 2013) and results in significant negative physical and mental health outcomes across the life span. Nearly 1 in 5 children live below the poverty threshold (Semega et al. 2019) and more than 1 in 3 children live in a household facing material hardship (Rodems and Shaefer, 2020). Poverty and material hardship increase child and adolescent externalizing behaviors, which include rule breaking, attention problems, and aggression (Comeau and Boyle, 2018). Externalizing behaviors can lead to increased risks of alcohol use, lower academic achievement, and justice system involvement (Aebi et al., 2014; Hammerton et al., 2020; Okano et al., 2020). Addressing child behavior problems is important to preventing escalating behavior problems (e.g., substance abuse, criminal involvement, school dropout) into adolescence and adulthood (Okano et al., 2020). Prevention of child externalizing behaviors is important for child, family, and community wellbeing and the reduction of substantial economic costs related to poor health, lost access to education, juvenile justice involvement, and decreased workforce productivity (Alatupa et al. 2013; Knapp et al. 2011; Vergunst et al. 2019).

Household income levels, including fluctuations in income, can affect externalizing behaviors trajectories through multiple pathways (Comeau and Boyle, 2018; Miller and Votruba-Drzal, 2017). For example, parents earning low incomes may experience pressure due to economic constraints in fulfilling the material needs of the family such as food, housing, healthcare (Chaudry and Wimer, 2016). The family stress model (FSM) is a well-established model that posits household income influences child outcomes through a series of effects on caregiver distress, family conflict, and caregiving behaviors (Conger et al., 2002). This model has been used to understand how socioeconomic disadvantage and resulting economic pressure can lead to child externalizing behaviors including attention problems, rule-breaking, and aggressive behavior (Masarik and Conger, 2017).

Several longitudinal studies have highlighted the salience of income, material hardship, and economic pressure as predictors of child externalizing behaviors that range widely from aggressive behaviors (Neppl et al., 2016) to symptomology of disorders such as conduct disorder, oppositional defiant disorder, and attention deficit hyperactivity

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disorder (Shelleby, 2018; White et al., 2015). Of particular concern to the current study is the association between household income, parenting behaviors, and violent behavior during early childhood, which is a significant predictor of physical violence perpetration and injury over the life course (Tremblay et al., 2004; Broidy et al., 2003) and the most serious forms of delinquency (Nagin & Tremblay, 1999). Taken together, these studies suggest that economic security interventions that address the stressors associated with low income and economic pressure have the potential to prevent child behavior problems and subsequent negative behavioral trajectories.

There is limited research on the effects of policies that impact household income on child externalizing behaviors. One study found that Earned Income Tax Credit (EITC) benefits are associated with reduced child behavior problems (Hamad and Rehkopf, 2016) and another found an increase in family income through Temporary Assistance for Needy Families (TANF) is associated with the reduced likelihood of a child repeating a grade (Wang, 2015).

Minimum wage increases may be another avenue to support family economic security. State-level minimum wage policies increase the base earnings of hourly workers from the existing federal wage floor of $7.25. States with higher minimum wages may reduce economic pressure among families experiencing low income and have the potential to pull families out of poverty (Cooper, 2015). The primary focus of minimum wage studies to date has been in understanding its economic and employment effects. While there is increasing research interest in the health effects of minimum wage laws (Komro et al. 2016; Kaufman et al. 2020), few studies have explored how these policies affect child health (Leigh et al., 2019). Minimum wage policies have the potential to affect the family environment of a child by increasing household income, reducing parental stress, and reducing risk of violence exposure (Hill and Romich, 2018; Raissian and Bullinger, 2017).

Prior studies of the effects of minimum wage laws have relied upon vital records, arrest records, and annual population surveys. Both to improve our understanding of how minimum wage laws affect child externalizing behaviors, and improve causal inference, we evaluate the effect of state minimum wage laws on externalizing behaviors among children using longitudinal data and multidimensional measures in a population likely to be exposed to the effects of minimum wage policy. Based on the FSM and prior research, we hypothesized that increases in minimum wage will decrease child externalizing behaviors.

2. Methods

2.1. Study design and data sources

We use a difference in difference in differences (DDD) design to estimate the relationship between changes in state-level minimum wage laws and child externalizing behaviors (Wing et al. 2018). Our DDD design provides plausible causal inference by estimating the change in externalizing behavior as a function of the change in state specific minimum wage among those likely to be affected by increases in the minimum wage (lower education levels) compared to those who are less likely to be affected (higher education levels). Our DDD design provides two levels of design controls. First, it uses between states comparisons to account for changes in externalizing behaviors common to all states across time (e.g., secular trends, sudden changes in federal policy). In addition to the between-state control group, our DDD design employs an additional within state control group by contrasting the association between minimum wage and externalizing behaviors across levels of a family's likelihood of being affected by changes to minimum wage: families with a maternal education less than a high school degree, families with a maternal education equal to a high school degree, and families where maternal education is greater than a high school degree. The likelihood of adult earners being paid at the minimum wage varies across educational status, with 4% of those with less than a high school degree earning minimum wage, 2% with a high school degree earning minimum wage, and 1% to 2% of those with more than a high school education earning minimum wage (U.S. Bureau of Labor Statistics 2020). The higher education group serves as a within-state placebo group controlling for residual time varying confounders that are state specific such as other changes to state-specific policy that may affect outcomes. It should be noted that the education based comparison group does not need to be completely unaffected by minimum wage, but rather disproportionately less affected when compared to the intervention group. It is plausible that those in the sample with greater than a high school education may be affected by minimum wage, but they are less likely to be affected compared to the lower education groups. To the extent that there is an effect of the minimum wage for our comparison group, caregivers with greater than a high school education, a difference in difference estimate of this effect would be a combination of the true effect and residual bias unaccounted for by the between states comparisons. The DDD estimators among caregivers with a high school education or less would then remove both the residual bias shared by the education groups as well as the effect among caregivers with greater than a high school education, making its estimate conservative. If minimum wage is causally related with externalizing behaviors, we would expect to see the strongest effects among the less than high school education group compared to families with greater than a high school education due to the gradient of participation in minimum wage jobs.

All family data was taken from the Fragile Families and Child Wellbeing Study (FFCWS; Reichman et al. 2001). The FFCWS follows a cohort of 4,898 children born between 1998 and 2000. Families were sampled from 20 cities across 15 states, allowing for variation in exposure to state minimum wage laws. Families were followed over 6 waves corresponding to when the child was born as well as at target ages of 1, 3, 5, 9, and 15 years old. While the majority of surveys were completed at the target age, later follow-up occurred in a minority of cases at all waves. In our analysis, we did not include the final wave of data when the target age of the focal child was15 years since at that age the focal child may be entering the workforce as a low wage worker. Studies on the health effects of minimum wage laws among adolescent low wage earners have found inconsistent results (Leigh et al., 2019), and the mechanism of effect from an adolescent low-wage earner compared to the effects on the primary caregiver earner may vary. Therefore, we included data through wave 5 (target age 9) before the legal age of employment of the focal child. At wave 4, (target age 5), externalizing behaviors were assessed from a report of mothers and primary caregivers. In the subsequent wave, externalizing behaviors were assessed from a report of primary caregivers only. For comparability across waves, we restricted our data to families where the mother was the primary caregiver. The resulting sample included 2,892 families at wave 4 (target age 5, mean 5.1, SD = 0.21) and 3,353 families at wave 5 (target age 9, mean = 9.38, SD = 0.37); resulting in a sample of 3,820 unique families and 6,245 surveys across the two waves. To allow for construction of our DDD design, we further restricted our sample by removing surveys not reporting a survey year (n = 8), reporting a state residence outside the FFCWS catchment (n = 305), and missing data on maternal education (n = 2). Thus, our final sample consisted of 5,930 surveys across 3,659 unique families with children ranging from 5 to 11 years old across survey waves.

2.2. Study measures

2.2.1. Externalizing behaviors

Measures of externalizing behaviors were based on the Child Behavior Checklist (CBCL; Achenbach and Rescorla, 2001). While the CBCL consists of 113 behavior items, FFCWS utilizes a subset of these items to measure domains of externalizing behaviors. These items are further restricted when considering items consistently measured across waves. The domains measured include: rule breaking (# of items = 8) and attention problems (# of items = 3). All scales are scored by summing their constituent 3-level Likert items. Additionally, we created a

novel scale to measure child violent behavior from the following subset of the aggressive behavior scale items: "is cruel, bullies, or shows meanness to others", "destroys things belonging to family or others", "gets in many fights", "physically attacks people", and "threatens people." This scale is modified from a prior scale created from the CBCL items in FFCW used by Sattler et al (Sattler et al., 2019) by dropping the item "has a hot temper." This item was dropped due to the lack of explicit violent behavior being measured by the item. Due to the novelty of this violent behaviors scale, we estimated its internal consistency as well as factor structure at each wave to ensure its reliability prior to use in our models. Exploratory factor analyses were carried out using PROC FACTOR in SAS v9.4.

2.2.2. Minimum wage

State specific minimum wage was expressed as the difference between the state and federal minimum wage for each state in each study year (Komro et al., 2016). We adjusted for inflation by expressing all minimum wage variables in terms of 2020 dollars.

2.2.3. Covariates

Maternal age and education were self-reported by FFCWS mothers. Maternal education was categorized as less than a high school education, a high school education, or more than a high school education. Additionally, we included child's age at each wave and number of adults in the household. We obtained state-level economic covariates from the University of Kentucky Center for Poverty Research (University of Kentucky Center for Poverty Research, 2021). Economic covariates included the state unemployment rate, state poverty rate, gross state product, number of TANF recipients, number of Supplemental Nutrition Assistance Program (SNAP) recipients, state EITC rate, and whether the state EITC was refundable.

This study was deemed exempt from IRB review by Emory University.

2.3. Analytic methods

To estimate the change in reported externalizing behaviors, we estimated a series of linear models. While our DDD design efficiently accounts for a wide variety of confounding mechanisms, within-state time-dependent confounding is still a threat to valid inference. To test the robustness of our design to such threats, we estimate three sets of models for each behavioral scale. First, we estimated models of the following general form:

$$Y_{ist} = \beta_0 + \beta_1 MW_{st} + \beta_2 E1_i + \beta_3 E2_i + \beta_4 E1_i * MW_{st} + \beta_5 E2_i * MW_{st} + State_s + Year_t.$$

Where Y is the outcome for person i in state s at time t, MW is the state specific minimum wage at time t, E1 and E2 are indicators for whether person i is in the less than high school or high school education groups, State is a series of state fixed effects, Year is a series of year fixed effects. Year and state fixed effects control for any changes over time common to all states and any time invariant differences between states. Next, we added a series of individual and state level covariates including: maternal age, child's age, number of adults in the household, state unemployment rate, state poverty rate, gross state product, number of TANF recipients, number of SNAP recipients, state EITC rate, and whether the state EITC was refundable. Finally, alongside the prior covariates, we included education group and state specific linear and quadratic time trends to account for residual confounding not accounted for by measured covariates. For all models, β4 and β5 are the parameters of interest for estimating the effects of minimum wage on externalizing behaviors and represent the differences in the change in externalizing behaviors between each education group compared to those with a maternal education greater than high school per $1 increase in the minimum wage. To allow for comparisons across all models, all outcomes were transformed using the percent of maximum scaling method.

To account for the complex survey design of the FFCWS, all descriptive statistics and models were estimated using the appropriate survey procedure in SAS v9.4. These estimates account for geographic clustering at the city level in the estimation of the standard errors. The city weights for the in-home study provided by FFCWS were used for all analyses. These weights account for attrition over time, self-selection into the in-home study from the larger FFCWS sample, and provide representative estimates for the originally sampled cities.

3. Results

From 2002 to 2010, there were 31 legal changes in state minimum wage laws (independent of federal changes) in FFCWS states. Four states maintained the federal minimum wage throughout the study period. When the state minimum wage differed from the federal standard, the difference averaged $1.51 (SD $0.70) and ranged from $0.06 to $2.99.

Our novel scale for violent behavior demonstrated acceptable reliability across all survey waves (Table 1). Internal consistency ranged

Table 1
Factor Loadings for Violent Behaviors Scale by Year.

Items	Year 5 Loadings	Year 9 Loadings
Cruel, bullies, or shows meanness to others	0.62	0.62
Destroys things belonging to family or others	0.56	0.57
Gets in many fights	0.63	0.63
Physically attacks people	0.67	0.71
Threatens people	0.55	0.69
Chronbach's Alpha	0.73	0.76

Table 2
Descriptive Stats.

		Wave 4		Wave 5	
Variable	Maternal Education Group	Mean	95% CI	Mean	95% CI
Child's Age	Greater than High School	5.09	(5.05, 5.12)	9.32	(9.28, 9.36)
	High School	5.10	(5.07, 5.13)	9.33	(9.28, 9.38)
	Less than High School	5.11	(5.08, 5.13)	9.41	(9.37, 9.45)
Maternal Age	Greater than High School	33.2	(32.38, 34.02)	37.43	(36.66, 38.21)
	High School	29.84	(29.18, 30.51)	34.64	(34.02, 35.27)
	Less than High School	29.17	(28.67, 29.67)	33.51	(32.88, 34.13)
# of Adults in Household	Greater than High School	1.98	(1.90, 2.06)	2.01	(1.94, 2.09)
	High School	1.96	(1.88, 2.04)	2.00	(1.92, 2.07)
	Less than High School	2.09	(1.99, 2.19)	2.10	(1.99, 2.22)
Attention	Greater than High School	23.05	(19.88, 26.23)	21.2	(19.07, 23.32)
	High School	25.26	(22.84, 27.69)	22.9	(20.26, 25.53)
	Less than High School	31.27	(28.41, 34.14)	22.53	(19.88, 25.18)
Rule Breaking	Greater than High School	3.09	(2.67, 3.50)	2.69	(2.25, 3.13)
	High School	4.07	(3.21, 4.93)	3.94	(3.29, 4.60)
	Less than High School	4.35	(3.61, 5.08)	4.15	(3.30, 5.00)
Violence	Greater than High School	6.33	(5.25, 7.4)	3.45	(2.81, 4.08)
	High School	9.41	(7.54, 11.28)	5.41	(4.19, 6.63)
	Less than High School	9.35	(7.78, 10.91)	5.61	(4.40, 6.83)

Table 3
DDD Results.

Outcome	DDD Contrast	Unadjusted DDD		Covariate Adjusted DDD		Covariate and Group Trends Adjusted DDD	
		Beta (95% CI)	P-Value	Beta (95% CI)	P-Value	Beta (95% CI)	P-Value
Attention	Less than HS vs Greater than HS	0.92 (−2.18 ,4.02)	0.553	1.02 (−2.16 ,4.19)	0.524	0.63 (−2.34 ,3.61)	0.671
	HS vs Greater than HS	−1.96 (−4.59 ,0.67)	0.141	−1.94 (−4.63 ,0.75)	0.154	−1.75 (−4.89 ,1.38)	0.267
Rule Breaking	Less than HS vs Greater than HS	−0.67 (−1.40 ,0.06)	0.072	−0.64 (−1.38 ,0.11)	0.094	−0.70 (−1.52 ,0.12)	0.093
	HS vs Greater than HS	−0.22 (−0.93 ,0.49)	0.544	−0.19 (−0.88 ,0.50)	0.582	−0.38 (−1.10 ,0.35)	0.303
Violence	Less than HS vs Greater than HS	−1.81 (−2.95 , −0.67)	0.003	−1.74 (−2.92 , −0.56)	0.005	−1.90 (−3.12 , −0.68)	0.003
	HS vs Greater than HS	0.32 (−0.96 ,1.60)	0.614	0.42 (−0.83 ,1.66)	0.505	0.18 (−1.16 ,1.52)	0.793

*HS = high school.

from 0.73 to 0.76 across years. Factor loadings were similarly consistent across waves. Across waves and items, factor loadings ranged from 0.55 to 0.71. Across all education groups, children were approximately 5 years of age at wave 4 and 9 years of age at wave 5. Maternal age varied across education group with lower education groups having on average lower maternal age. A similar number of adults lived in the homes of sample families across all education groups. Families where the mother had less than a high school education had higher externalizing behavior problems across all domains (Table 2). Our estimated effects and inferences were similar across all three model specifications. For simplicity, we discuss the results from our final model including both covariates and group specific time trends. Results for all model specifications can be found in Table 3. For those children whose mothers reported having a high school degree, we found no association or consistent pattern between minimum wage increases and any of the externalizing behavior scales compared to children whose mothers reported education greater than high school. For children whose mothers reported less than a high school degree, the direction of the association between the violent behaviors scale and minimum wage increases were consistently in the hypothesized negative direction (Table 3), while no consistent association was observed between minimum wage with the rule breaking and attention scales. We found that a $1 increase in the minimum wage was associated with an approximately 2% reduction in violent behaviors (β = -1.90, 95%CI[-3.12, −0.68], p = 0.003).

4. Discussion

Child externalizing behaviors, including aggressive behavior, rule breaking, and attention problems, are associated with numerous negative social, economic, and health consequences (Okado and Bierman 2015; Vergunst et al. 2019). This study provides empirical evidence that increased state-level minimum wages are associated with reductions in a subset of the most serious child externalizing behaviors, violent behaviors. Results suggest that if states increased minimum wages by one dollar there would be approximately a 2% reduction in child violent behaviors.

We did not detect statistically significant effects of minimum wage increases on violent behaviors between primary caregivers with a high school degree compared to those with more than a high school degree, a comparison that may offer a greater distinction between likely exposure to minimum wage changes. Also, we did not detect minimum wage effects on attention problems and rule breaking. Therefore, effects were only detected among the most extreme outcome behaviors, which indicate an important benefit of increased minimum wage as a violence prevention strategy.

This study adds to a growing body of evidence that suggests increasing minimum wage may improve child outcomes that are associated with significant individual and societal costs (Bullinger, 2017). Exhibiting violent behaviors during childhood is a precursor to conduct problems and violence during adolescence and adulthood (Okado and Bierman, 2015), leading to multiple societal costs. In the United States, the annual cost of youth violence is over $20 billion (National Center for Injury Prevention and Control (U.S.). Division of Violence Prevention, 2020). More generally, child externalizing behaviors are associated with substantial economic costs including those related to health care, education, juvenile justice, and workforce productivity (Alatupa et al. 2013; Knapp et al. 2011; Vergunst et al. 2019).

Our study findings are consistent with research that indicates improving household income reduces risk for child externalizing behavior (Russell et al., 2016). Higher minimum wages increase household income which can improve child development, adult health, and economic mobility (Hill and Romich, 2018). Increasing household income has a particularly strong effect for children living in poverty and younger children (Duncan et al., 2014), making minimum wage a promising intervention for children who are at greatest risk for negative outcomes associated with externalizing behaviors. Children may experience more benefit from minimum wage policies as the increase in economic resources in the family addresses critical risk factors including parent stress, parent–child relationships, and access to high-quality educational opportunities (Hill and Romich, 2018). Further, there is accumulating evidence that approaches that offer financial resources promote parent and child mental health more generally (Huang et al., 2014a; Huang et al., 2014b; 2016). Therefore, it is not clear why we did not observe minimum wage effects on attention problems or rule breaking.

Given our study's inconsistent results, more research examining interventions to reduce child externalizing behaviors, which move beyond parenting and parent mental health interventions, to include economic security, are needed (Shelleby, 2018). The FSM highlights key mechanisms in the link between economic disadvantage and child externalizing behaviors, which include parent distress, family conflict, parenting behaviors, and parent–child relationship factors (Conger et al. 2002; Neppl et al. 2016). However, research also indicates that factors other than parent psychological functioning and parenting are important (Shelleby, 2018), including factors related to household income such as housing, food insecurity, and environmental toxin exposure (Jackson and Vaughn, 2017; Hobbs and King, 2018).

Our study is not without limitations. Proxy reporting of child externalizing behaviors by the primary caregiver may result in measurement error (Poulain et al. 2020). However, discrepancies between parent report and child report are minimized for easily observed externalizing behaviors as used in our study (Poulain et al. 2020). This limitation is further addressed by our analysis of changes in externalizing behaviors over time. We would not expect proxy error to impact our primary results unless changes in the misreporting of externalizing behaviors over time were systematically different across states and education groups. Our strong quasi-experimental design also minimizes potential confounding, but it remains possible that residual confounding may bias study results. To test the robustness of our models to omitted confounders, we include both state and education group specific linear time trends, and find no substantive difference in our results.

The limited research examining the effect of economic security policies on child externalizing behaviors is notable given the consistent link between lower household income and externalizing behavior (Russell et al., 2016). To improve population-level child health it is imperative to address social determinants with policies that increase resources to

mitigate behavioral, family, and community risks. The potential long-lasting impacts of increasing family income largely depend upon the improvement of social conditions that influence child development (Van Ryzin et al. 2018). Our findings add to the growing scientific literature showing the impact of minimum wage policies on health outcomes (Leigh et al., 2019) and support future research that examines how minimum wage affects socioeconomic conditions to improve child health. We further provide timely findings that highlight the impact of minimum wage on children's externalizing behavior, a prevalent mental health concern with high costs throughout childhood and adulthood (Vergunst et al. 2019). Social determinants of health are critical but often overlooked factors that contribute to child mental and behavioral health outcomes. Increased state minimum wages have the potential to prevent childhood violent behaviors and thus improve long-term health, social, and economic outcomes.

5. Author Note

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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